Photo-stories from Durham:  
a case study on assessing design innovation

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Photo-stories from Durham: a case study on assessing design innovation
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Abstract
In 2002 the DfEE and DATA Strategy Group for design & technology recommended that research be undertaken to examine the extent to which – and the ways in which – innovation and team-work might be more fully recognised and rewarded in assessment processes, particularly within GCSE.

As a result of this, in January 2003 the Department for Education and Skills (DfES) and the Qualifications and Curriculum Authority (QCA) asked the Technology Education Research Unit (TERU) at Goldsmiths College to undertake a research and development project, ‘Assessing Design Innovation’, to develop a system of assessment that would measure and reward design innovators. This paper focuses on the ‘live’ classroom activity carried out as phase 2 of the project, designed to examine the activity and the pedagogy in use with teachers that enabled them to promote innovative performance in their students. It presents a case study of one such project that:

- outlines the factors influencing the phase 2 project structure and content;
- explores and the impact of handling and modelling collections on having and growing ideas;
- traces the emergence of a ‘photo’ storyline and its impact on learners and assessors;
- examines how the findings of the project influence phase 3 of the Assessing Design Innovation project, the construction of assessment activities that would explicitly promote evidence of the process of design innovation.

Keywords: creativity, innovation, assessment, photo-story-line, handling-collection

Introduction
As a result of one of recommendations made to the DFES Strategy Group in March, 2002, that:

Research is carried out into effective Design and Technology practice, including appropriate assessment tools and processes, with special reference to:

- creativity and innovation;
- the ephemeral nature of some design decisions;
- the use of ICT in creative activity;
- the relationship between process and product.

(Prest, 2002: 22)

The Technology Education Research Unit (TERU) was asked to undertake a research and development project ‘Assessing Design Innovation’ (Kimbell et al, 2004), to develop a system of assessment that would measure and reward design innovators.

This paper examines the live classroom activity that took place as phase 2 of this research and development project. The primary driver behind the paper is to examine the classroom activity that might influence phase 3 of the project, the development of assessment activities for design and technology that better reflect the vision statement in NC2000 (DfEE, 1999: p15). As such, the paper is structured into the following sections: Introduction, Descriptors of Design Innovation, Phase 2 Method, Durham Case Study – Structure, Handling Collections, Modelling Resources, Photo-story-line and Findings.

Descriptors of Design Innovation
Phase 1 of the Assessing Design Innovation project was concerned with identifying descriptors of innovative performance in design and technology as a first step to developing an assessment framework. Initially, we had to confront the issues around the definitions of creativity and innovation and what we meant by ‘design innovators’.

Firstly, we drew on the breadth of research already conducted in this area. Many researchers acknowledge that a precise definition of creativity is difficult to pin down.
Feldman, Csikszentmihayli and Gardner (1994), Floistad (1993) and Taylor (1988) all concur that creativity is a complex combination of phenomena whose meaning cannot be captured in a simple and precise definition. The National Advisory Committee on Creative and Cultural Education (NACCCE) acknowledge:

The word 'creativity' is used in different ways, in different contexts. It has an elusive definition.

(NACCCE, 1999: 27)

However, after some debate, they go on to state:

We therefore define creativity as:

Imaginative activity fashioned so as to produce outcomes that are both original and of value.

(NACCCE, 1999: 29)

This link with outcome is something with which Reis and Renzulli (1991) agree. They state: "...creativity exists only when a person produces creative products"; Cartier (2000) concurs, stating that: "...without a creative product, we cannot conclude that a person is creative".

A simple definition of innovation is equally elusive. Jacques and Ryan (1978) see innovation as one and the same thing as creativity. Bolen et al (1984) see innovation as improvements on existing products. Others such as Majaro (1988) venture: "...innovation is the commercial use of the solution", in other words, a creative solution, successfully marketed.

As a start-point for initial discussions with participating teachers and exam boards we adopted a broad notion of ‘design innovation’ – creativity as defined by NACCCE, broadened still further to take into account market-place success. From these discussions we realised there was, amongst teachers, a sufficiently well understood common meaning for ‘innovative’ designing for us to rely on teachers' implicit understandings, rather than any definition from literature. We decided that the best way to get at this understanding was through drawing descriptors from objects that students had designed.

In short, this involved asking the participating teachers and exam boards to stand outside familiar assessment frameworks, such as the General Certificate in Secondary Education (GCSE) and Standard Assessment Tests (SATs), and identify four samples of work, two of which they saw as exemplifying innovative performance in design and technology and two of which they saw as exemplifying solid, but non-innovative performance in design and technology. To support this process we developed a ‘Why?’ form (Kimbell et al, 2004: Appendix 2) for teachers to complete, in which we invited them to explain to us the reasons they had chosen the samples as characteristic of innovative or non-innovative performance. In addition, they were asked to choose five words from a list compiled from initial discussion with teachers (Figure 1), which best described their thoughts about the work:

| Exciting, relentless, new, unexpected, powerful, undeterred, fashionable, ‘wow’, risky, unusual, disciplined, the best, weird, bending the rules, steady, desirable, OK, speculative, might work, thorough, thoughtful, novel, different, professional. |

(Kimbell et al, 1994: Appendix 2)

Figure 1: Words to describe the thoughts

We were then able to compare and contrast 96 samples of innovative and non-innovative work, along with the ‘Why?’ forms. From this we were able to derive discriminators of innovative work and a preliminary framework, with three overarching categories (Figure 2), for describing innovation. These were used to support classroom activity during phase 2 of the project.
Having Ideas
• suspend existing reality - get outside conventional constraints solutions;
• dice on the edge - not play safe.

Growing Ideas
• grow design ideas through an explicit ‘web’ of thought and action;
  - model and explore ideas as they develop.
  - recognise and do something about challenges, opportunities and problems throughout the activity: reconciling conflict and trade-offs, managing complexity, optimising ideas;
• pursue ideas tenaciously - like a dog with a bone.

Validating/Proving Ideas
• step outside ideas and keep a critical eye on developments;
• purposefully connect, everything, so that solutions draw together and optimise all parts and all issues.

Figure 2: Categories for describing innovation

Phase 2 Method
We asked teachers to run projects over two whole-days, completely free of the normal constraints of examination assessment criteria. Participating schools were sent guidance on the aims the project, with specific reference made to the overarching categories outlined in Figure 2 above:

The aim of the activity will be to support learners to operate as innovatively as possible within a design and technology challenge. Within this are a set of sub-aims that are drawn largely from the analysis of work to date. Three overarching categories have emerged as useful: having ideas; growing ideas; and validating ideas.

The activity should:
• Be a design and technology challenge, and not constrained by existing NC programmes of study or assessment criteria.
• Be designed to rapidly fast forward learners into the design context without advance preparatory work.
• Take place continuously over one or two whole days.

• Prioritise in getting ‘wow’ work from learners over tangible evidence for assessment purposes.

and

• Be structured to elicit performance evidence that is supportive to the development of ideas and outcomes.
• Take ideas forward to 3D modelled prototypes.

(Excerpt from handout to participating schools, 8th May 2003)

However, as the purpose of phase 2 was to examine the activity and the pedagogy in use by teachers that enabled them to promote innovative performance in their students, the topic, structure, learning and teaching strategies and resources for the project were left up to the participating teacher. The projects were run in May and June 2003 with Years 3-6 in primary schools and Years 9, 10 and 12 in secondary schools.

Our approach was to have two observers in the classroom, one ‘Roving Observer’, observing the teacher in everything he/she did (with a particular focus on encouraging design innovation) and observing the structure and pace of classroom activity - the other ‘Learner Observer’, observing four pre-selected learners. These learners were identified by the teacher as the most innovative in the group, least innovative in the group and two in-between. A final ‘Group Observation’ allowed us to observe the interaction of groups of learners (if that happened during the project).

These observations were supported by observation schedules (Kimbell et al, 2004: Appendices 4, 5, 6). The schedules were designed to highlight specific issues concerning design innovation and included questions such as ‘How is the teacher enabling/ motivating/ encouraging the learners?’ and coded observations about pace and intent. Every minute of these two-day projects was observed.

In addition, learners were asked to complete ‘What I Think’ questionnaires (Kimbell et al, 2004: Appendix 7) at the end of the activity, in which they were asked to record responses to a range of questions about the project. A structured interview was conducted with the participating teacher (Kimbell et al, 2004: Appendix 8, 9) in which they were asked to comment on the project.
structure and the strategies they had used to encourage ‘having ideas’, ‘growing ideas’ and ‘validating ideas’.

The outcomes from this phase were twofold. Firstly, we had a range of work from students and photographs of them doing it and, secondly, we had the observation data. The quantitative and qualitative data were coded and added to a spreadsheet for analysis, in order to identify any emerging patterns and relationships.

Durham Case Study
This case study focuses on one of the phase 2 projects described above, which was run in partnership with Durham LEA. The project was run with a Year 10 Textiles group and was to develop ideas and a prototype for a toddler’s sun-hat. In essence, a familiar topic delivered through a new design approach.

The project overview written by the participating teacher was as follows:

Childs “Fun Sun” Hat - Project overview
The project potentially can fulfill the following criteria:
• Lead to a diversity of ideas which may be whacky, innovative, and new.
• Give students opportunities to work outside of conventions (to not play safe)
• Grow ideas, model and explore as they develop. A wide range of materials, techniques and equipment will be accessible to encourage this area of development.
• Pose challenges and problems and require students to acknowledge trade-offs, i.e. protection from sun against appearance and novelty appeal. Optimising ideas!
• Regular self-analysis/ evaluation against desired outcome will ensure students keep a critical eye on development. This will include group evaluation.
• The task relies on existing knowledge/ experiences, though supportive information will be available, i.e. smart fabrics with special UVA features, images of children’s products, examples of hats!
• The task fits well into the 10hr recommendation.
• It allows students to work in small groups or individually (I am confident there will be a mix of both). Regardless some activities demand group consultation.
• The outcome is a 3D modelled prototype.

Resources
Worksheets to guide students through day 1, hat samples, sun protection/ prevention info/ examples, variety of images relating to children, variety of materials, equipment, textile decoration materials, balloons to simulate toddler’s head....

Data was collected as outlined in section 3, phase 2 Method. This meant we could examine the unfolding nature of the experience, from both the teacher and learner perspective.

When we began to analyse the observational data and photographs, some interesting things began to emerge about the:
• project structure;
• the kind of things the teacher did to prompt and support design innovation;
• the ways in which students reacted to those pedagogic prompts.

Project Structure
Both the teacher and the learners responded very positively to having blocks of time, and we could very quickly see the empowering effect of having time to work without the interruption of lesson changes.

When asked in the post-project interview ‘Did the timescale work and why/ why not?’, the teacher stated:

Having longer blocks of time made a real difference in terms of progression. Once the pupils were engaged with the activity they were really motivated by knowing they had lots of time to try different things out, without me stopping them and saying ‘time to pack away. Some of them have done more [during this project] than they would normally in months.

She went on to say:

It also meant that the project didn’t need to be so rigid in structure, with me telling the pupils they had to move on to a different type of activity even though they weren’t ready to. It freed them to move from having ideas to growing ideas to having ideas, and from modelling to drawing exactly when they needed to.

The post-activity feedback from learners was also positive, with 6 out of 41 responses to ‘Good Things about the Activity?’ question in the ‘What I Think’ questionnaire, being about the longer time available. They valued not having to “stop and start” and having the freedom to “get on with trying things out”.

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Handling Collection
Learners also responded very well to the supporting resources provided. The teacher provided a selection of objects/products, a ‘Handling Collection’, that learners had access to at all times. These were directly related to the project, e.g. samples of hats, and indirectly related to the project, e.g. sunglasses, fans.

The learner observation data describes:

[Learner] moves quickly to collection. Mainly using hats to help with size, shape etc., but using bits from other products to ‘have’ ideas – one includes sunglasses built in to a cap.”
(Excerpt from Learner Observation Data – Day 1 9.15 am to 9.20 am)

Modelling Resources
Learners liked having a range of modelling resources, such as card, foam board, fabric, pipe cleaners etc., freely available. Eleven out of 41 responses to ‘Good Things about the Activity?’ in the ‘What I Think’ questionnaire were about the materials available. They valued having “a choice of materials” and “getting to use materials”.

Giving learners explicit permission to be creative and to make use of the materials for modelling as and when they wanted, was also observed to be important in freeing them to have and grow ideas.

They look at ‘favourite ideas’ on the A3 sheet - then go around class and feedback on what the kids most liked ‘what kind of components most impressed you?’ All round class ideas are very good - kids really getting into this. T gets kids to feedback then motivating them by telling them the range of textiles and other stuff available for them to use - ample amount of creativity possible with the material. T says ‘use the materials you need to explore!’ tells them that they’ve used the making/ processes this year - little will be new as far as that concerned.
(Excerpt from Roving Reporter Data – Day 1 9.25 am to 9.40 am)

This was backed up by the learner observation data:

T says they can now work how they want, and there is a rush to start to model ideas
(Excerpt from Learner Observation Data – Day 1 10.15 am)

Photo-story-line
The photographic data presented the most exciting and unexpected finding from the Durham project. When we looked at the digital photos taken of one of the groups being observed in chronological order, what emerged was an impressive photographic record of progression (Figure 3). For this group, photos were taken at approximately one hour intervals throughout the project. This provided a story of their designing/modelling/development time, not evident for other learners. In addition the idea and prototype that emerged was thought to be innovative and exciting. Not only that, but the group response to being shown photos of their work was also noted with interest.
They are amazed by the progress they had made over the two days, and how the hat has changed. Couldn’t remember why/ who they’d changed the brim. They are excited by photos and ask for more to be taken as they try to finish.

(Excerpt from Group Observation Data – Day 2 11.00am)

Findings
The Durham case study provided some interesting and useful findings. From the combined data we were able to gain a clear understanding of the two-day events. It was felt by the teacher, learners and observers alike that some pedagogical strategies played a key part in encouraging innovative performance.

The teacher identified:
- Having a clear task, with emphasis on access to resources.
- Having blocks of time.
- The need to structure the time so the learners were forced to consider ways into the task (having ideas) and ways to reflect on progress (growing and validating ideas).
- Allowing learners to have a different approach – some draw then model, some model more quickly.

The learners identified:
- Having blocks of time.
- Handling collections as being a source of inspiration.
- Being able to model early on in the project using a range of materials and move freely from having to growing and validating in any order at pretty much any time.
- Support from other learners.

As well as the positive findings, there was one major concern about this, and all other phase 2 projects. Whilst the prototypes produced by learners were exciting and valuable, there was little evidence of the design and development process. There was no requirement during phase 2 projects to develop any type of portfolio or process diary to explain what they had done. This meant the best source of evidence was the combined observation data – not a realistic requirement for public examination purposes.

However the major finding of this case study balanced this up.

The Roving, Learner and Group observations identified:
- The emergence of a photo-story-line to document process and noted its motivational...
benefits in maintaining impetus behind growing ideas, adding to learner's sense of confidence and progress. There is a critical moment when learners see development of their process that is simultaneously reflective and progressive.

This meant that, although we did not have good process data from portfolios, we did have a good story of the phases of development of the 'cooling hat'.

Therefore, the major challenge for phase 3 of the 'Assessing Design Innovation' project was to find a way to design assessment activities that were structured to leave a trail of evidence around the evolution of the outcome, whilst incorporating the pedagogy identified during phase 2 as promoting innovative performance. A further challenge was to develop a manageable system for producing a photo-story-line for each learner. The resulting portfolio assessment system incorporated all the findings outlined above, including the photo-story-line, produced by printing directly from digital camera memory cards - quick and simple (Figure 4).

![Figure 4: Portfolio Assessment System](image-url)
Successful completion of phase 3, revealed the true power of the photo-story-line. For assessment purposes, it provides an evidence trail, making it possible to see development of ideas (Figure 4). Just as importantly for learners, each photograph has the potential to be a critical moment in ‘growing’ and ‘proving’ ideas. Put together the photo-story-line gives learners opportunities to reflect and, therefore, actively construct real-time narratives about their design. In conclusion, the photo-story-line works as a tool to help assess and support innovative design, and, when used as part of the portfolio assessment system, has enormous potential to free up both design and assessment practice in schools.

References
Cartier, F. (2000), Review of Understanding Those who Create, in the MENSAB Journal, 46 (1) (p. 79)
Merritt, L.L. (1985), Innovation Measures, in H.H. Willard et al. (Eds)
NACCCE (1999), All Our Futures: Creativity, Culture, and Education, London: DfEE
Appendix 2

Why did you choose that project?

<table>
<thead>
<tr>
<th>proj no.</th>
<th>KS</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
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</thead>
</table>

rate the creativity / innovation .......

summarise why you chose the project ..... is it to do with

the outcome?

the process?

the setting/task?

the person?

do any of these words help to describe your thoughts about the work?

thoughtful    OK    disciplined    powerful    different

novel    weird    thorough    relentless    bending the rules

unexpected    ‘wow’    unusual    desirable    steady

might work    risky    fashionable    speculative    the best

undeterred    exciting    new

professional

please add new words that help to describe the work

please put a ring round the five best descriptors
<table>
<thead>
<tr>
<th>Time</th>
<th>What's going on?</th>
<th>Critical Incident?</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>How is the teacher enabling/motivating/encouraging the learners?</td>
<td></td>
</tr>
</tbody>
</table>

- **S** = stationary
- **H** = Having
- **W** = Whole Class
- **P** = Pondering
- **G** = Growing
- **V** = Validating
- **I** = Individual

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### Appendix 5

<table>
<thead>
<tr>
<th>Time</th>
<th>Intentions</th>
<th>Manifestations</th>
<th>Narrative</th>
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<tr>
<td></td>
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<td>arranging</td>
<td>writing</td>
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<td>measuring</td>
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<td></td>
<td></td>
<td>marking out</td>
<td>- other</td>
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</tbody>
</table>

**Legend:**
- S = stationary
- P = podding
- M = monitored
- dir = directed by teacher
- sup = supported by teacher
- W = whole class
- G = group work
- col = working collaboratively
- I = individual

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<table>
<thead>
<tr>
<th>Group</th>
<th>Pupil A</th>
<th>G/B</th>
<th>Pupil B</th>
<th>G/B</th>
<th>Pupil C</th>
<th>G/B</th>
<th>School</th>
<th>Teacher</th>
<th>Year Gr.</th>
<th>Observer</th>
<th>Date</th>
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### Appendix 6

#### Time frame (approx 1 hour)

<table>
<thead>
<tr>
<th>GP</th>
<th>GS</th>
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</thead>
</table>

#### Whole Group
- Amount of discussion
- Quality of discussion
- Quality of ideas in discussion

#### Individual within group

**Contributing to group (active)**

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<tr>
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<th>S</th>
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**Listening to others (reflective)**

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<table>
<thead>
<tr>
<th>S</th>
<th>= stationary</th>
<th>GP = Group Project</th>
<th>H = Having</th>
<th>L = Leading</th>
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</thead>
<tbody>
<tr>
<td>P</td>
<td>= poddling</td>
<td>GS = Group Specific activity</td>
<td>G = Growing</td>
<td>S = Supporting</td>
</tr>
<tr>
<td>M</td>
<td>= motoring</td>
<td></td>
<td>V = Validating</td>
<td></td>
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</tbody>
</table>

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Appendix 7

What I think

1. **about the project:** Underline the five comments that best describe how you feel

- I ended up with what I had planned
- I didn’t know quite what to do
- it was really hard work
- the time was well organised
- it was a real ‘wow’
- I would have liked to do more in teams
- it was easy to do good work
- the teacher got us to do some helpful things
- I would have liked to do more on my own
- it was a bit weird
- I couldn’t do what I wanted to do
- I had great fun
- the activities were a bit predictable
- I felt too controlled
- it was different to normal
- some of my time was wasted
- I thought it was exciting

2. **about my work:** Circle the five words that best describe how you feel

- thoughtful
- OK
- novel
- leading-edge
- might work
- untested
- unexpected
- determined
- undeterred
- marketable
- fashionable
- professional
- exciting
- predictable
- effective new
- orderly
- speculative
- tenacious
- surprising
- risky
- brave
- powerful
- different
- fast
- fluid
- bending the rules
- acceptable
- confident
- steady
- reliable
- powerful
- different
- controlled
- experienced

3. the three things about the project that were **most helpful** to me

4. the three things about the project that were **least helpful** to me

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Looking back at the planning sheet

were there anything different about your planning for this project? and why?

were you confident it would all work?

were there any uncertain bits - ie that you were not sure would work?

How did the project go?

thinking about having ideas

• where did ideas come from?
• how did you help that?
• where there any key incidents/factors?

thinking about growing ideas

• what worked best for them?

• why do you think that was?

• did you do anything you wouldn’t normally do in a project? and why?

• did it work as you expected? and why?

• what things hindered progress? and why?

• did the timescale work out? and why?
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thinking about validating ideas

- how did you help them check their ideas?
- as they were going along ... 

- at the end ........

What about next time?

would you do this kind of project again?
and why/why not?

what (about the work) was most...
- pleasing
- disappointing
- surprising
- interesting

what would you change next time?
- different strategies?
- different timing?
- different style?
- different topic?
- different resources?

anything else that we should have asked?
or that you would like to say about the project?